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In the fourth part of the work, M. Duhamel has applied the general considerations developed in the first part to mechanics or the "science of forces." Technically this is one of the most important parts of the work.

In the fifth part, which is a very brief posthumous publication, he has attacked the problems of ethics, sociology, and theology. He had intended this section to be the final application of the principles so finely expounded in the work proper. "The scientific spirit," he said, "is the only legitimate guide in the study of any subject in which the elements exhibit relations which admit of the employment of reasoning." The scientific spirit, in this same sense, is made his only guide in his excursions into the realm of sentiment and of faith. It is distinctly the weakest part of the whole work, and offers a fine specimen of the very type of research which he sought to undermine by his investigations on the methods of science. Objection cannot be made so much to his reasoning as to the premises from which his reasoning starts; and such premises, as all know, are largely a matter of heredity, constitution, personal experience, and habit. But it seems impossible that a man who was a contemporary of Darwin, Strauss, and Renan could have uttered opinions like those here given on the origin of life and the system of divine providence. Of the discoveries of modern research in the domains of biology, ethnology, anthropology, and sociology, there is no trace or appreciation. Of the nobility of character, purity of sentiment, and high ideality which pervade this part of the work, there can be no question whatever; but when we look back upon the fine achievements in the theory of knowledge, in logic, mathematics, and mechanics, and formal philosophy generally, which the preceding parts exhibit, it is impossible to conceive that this last part was elaborated by the same mind. Nevertheless, from the point of view of the deistic theology itself, the development must be regarded as a considerable advance upon the old position.

This fifth part is in no sense an integral portion of the work, and is entirely in the nature of an appendix; it can be neglected. Each other part is complete in itself and obtainable by itself. And many will find here the elucidation they seek on all the subjects enumerated.

T. J. McCORMACK.

GRUNDRISS EINER GESCHICHTE DER NATURWISSENSCHAFTEN. Zugleich eine Einführung in das Studium der grundlegenden naturwissenschaftlichen Litteratur. Von Dr. Friedrich Dannemann, Direktor der Realschule zu Barmen. II. Band: Die Entwicklung der Naturwissenschaften. Mit 76 Abbildungen, zum grössten Teil in Wiedergabe nach den Originalwerken und einer Spektraltafel. Leipzig: Verlag von Wilhelm Engelmann. 1898. Pp., 435. Price, M. 10.50, bound.

Dr. Friedrich Dannemann has just published the second volume of his *History of the Natural Sciences*, which was begun in 1896. Volume I. consisted of a series of extracts from the works of the great natural philosophers and scientific inquirers of all ages, and aimed to give in each case a specimen of the spirit and power which

created the great fabric of modern language. In some respects the undertaking necessarily bore the impression of being fragmentary, and the majority of readers will be more pleased with the present second volume, which is a systematic and connected story of the development.

The author has had the advantage of the material gathered in Engelmann's series of *Scientific Classics*, and he has consciously exploited this fund to the fullest extent. Reproductions of original instruments and apparatus, of original diagrams and illustrations, which could otherwise have hardly been obtained, are strewn throughout the work, and greatly enhance its attractiveness and worth. Thus, for example, there are reproductions of the picture of the human muscular system given in the great work of Vesalius, printed in 1543; the telescopes and astronomical diagrams given in the works of Kepler; pictures of Gilbert's celebrated work *On the Magnet*; Tycho Brahé's quaint azimuth quadrant; the electrical machine and air-pumps of Guericke; Huygens's clocks; Leeuwenhoek's illustrations of human tissues; Ledermüller's illustrations of infusoria; the first electric pile of Volta; Haüy's dodecahedra; and the plate of the spectrum analysis first published by Kirchhoff and Bunsen, in 1860; etc., etc.

Dr. Dannemann has not slurred antiquity, and has given a much more appreciative estimate of the achievements of the ancients than is generally found in works of this character. He has not omitted to emphasise the consideration of the social and religious factors which have influenced science, and in many cases has well characterised the constant struggle for existence among ideas which has been a distinguishing mark of the development of modern knowledge. Mechanics, physics in all its branches, chemistry, astronomy, zoölogy, botany, and biology, come successively under his ken. The presentation generally is continuous and pleasing, and the author is to be congratulated upon the successful issue of his task. The book is one which fills a real want, and should be welcomed by all instructors of science.

T. J. McC.

PRISMATIC AND DIFFRACTION SPECTRA. Memoirs by *Joseph von Fraunhofer*.

Translated and edited by J. S. Ames, Ph. D., Professor of Physics in Johns Hopkins University. New York and London: Harper & Brothers. 1898. Pp., 68. Price, 60 cents.

THE FREE EXPANSION OF GASES. Memoirs by Gay-Lussac, Joule, and Joule and Thomson. Translated and edited by J. S. Ames. New York and London: Harper & Brothers. 1898. Pp., 106. Price, 75 cents.

It was inevitable that some English or American scientist should have been led to follow the example of Professor Ostwald, of Leipsic, in the publication of a series of *Scientific Classics*, and it is well that the work should have fallen into such good hands as those of the present editor and publishers. The new English series is termed "Harper's Scientific Memoirs," and will be similar in contents to the